

Claims

1. Method for the optical emission spectroscopy of a liquid (301) excited by a pulsed laser (402) focused on its surface, characterized in that the analysis zone (402) is scanned by a laminar flow of gas (309) having sufficient velocity and cross section to eliminate the residues of the plasma in suspension in the gas and resulting from a first laser impulse before the following laser impulse supervenes.
2. Method according to claim 1, characterized in that the laminar flow of gas achieves a contention effect on the free surface of the liquid.
3. Method according to claim 1 or 2, characterized in that the velocity of the gas is determined as a function of at least one of the following characteristics of the liquid analyzed: its temperature, its viscosity, its rate of flow, the turbulent or laminar nature of its flow.
4. Method according to any one of claims 1 to 3, characterized in that the cross section swept by the laminar flow of the gas is determined according to at least one of the following characteristics: speed of expansion of the plasma, rate of recurrence of the laser pulses, accuracy of the measurement.
5. Method according to any one of the foregoing claims, characterized in that the liquid is flowing in the analysis zone.
6. Method according to any one of the foregoing claims, characterized in that the gas is carried into the analysis zone by a duct (313, 302) surrounding the duct (302) of the liquid being analyzed.
7. Method according to any one of the foregoing claims, characterized in that the laser beam is tilted at an angle other than 90 degrees with respect to the plane formed by the surface of the liquid.
8. Method according to claim 7, characterized in that the laser beam is tilted at an angle greater than 60 degrees with respect to the plane formed by the surface of the

liquid.

9. Method according to any one of the foregoing claims, characterized in that the beam emitted by the liquid following excitation by the laser beam is collected colinearly to the laser beam.

10. Method according to any one of the foregoing claims, characterized in that in that the gas is argon or helium.

11. Apparatus for the optical emission spectroscopy of a liquid excited by a pulsed laser focused on the surface of this liquid, characterized in that it comprises:

a laser suitable for generating coherent light pulses of a power density of at least one Gw/cm²,

means capable of generating a laminar jet of liquid to be analyzed, on a length of at least one centimeter,

means capable of generating a laminar jet of gas parallel to the surface of the liquid to be analyzed, and in contact therewith, of eliminating the residues of the plasma in suspension in the gas and resulting from a first laser impulse,

means capable of focusing the laser beam into the zone of analysis, onto the surface of the jet of liquid to be analyzed,

a means capable of collecting the light resulting from the interaction of the light pulses of the laser with the jet of the liquid being analyzed,

a spectroscope able to operate in the range of frequencies where the rays emitted from the liquid to be analyzed are located, and arranged so as to receive the interaction light collected by the optical fiber bundle,

means able to circulate the liquid being analyzed, in jet form, and

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means able to circulate in jet form the gas that is to be circulated tangentially to the liquid to be analyzed.

12. Apparatus according to claim 11, characterized in that the means able to collect the light emitted from the liquid to be analyzed is such that this light is collected in colinearity with the excitation laser beam,

and in that the apparatus comprises an air-tight enclosure in which the liquid to be analyzed and the means able to generate the laminar jet of gas,

the colinearity of the excitation laser beam and the direction of the collected light permit the use of only one enclosure porthole for the laser beam and the collected light.